

OBSERVATIONS ON ABNORMAL GROWTH OF THE ARMS AND TENTACLES IN THE SQUID GENUS *ROSSIA*¹

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INTRODUCTION

During the course of a routine examination of the cephalopods collected by the Woods Hole Oceanographic Institution's research vessel ATLANTIS during the Harvard-University of Havana expeditions of 1938-1939 around the coast of Cuba, several cases of abnormal growth were found in the genus *Rossia*. While records of abnormal growth, loss of arms or parts of arms, and regeneration of lost parts are numerous among the octopods and have been well reviewed by Lange (1920), few cases of regeneration have been recorded among the decapodous cephalopods and only one case of abnormal growth is reported in the literature. Okada (1938) reported a case of a branched right ventral arm in *Sepia esculenta* Hoyle.

The small sepiolid squids belonging to the genus *Rossia* are benthic in habitat, living in or on the mud in relatively deep water. Among the specimens taken in the ATLANTIS hauls were large numbers of the small sepiolid, *Rossia* (*Semirossia*) *tenera* Verrill. In making the identifications, which in the genus *Rossia* are often based upon the sucker arrangement on the tentacular clubs, it was first observed that the number of rows of suckers varied widely. While the usual number of rows of suckers is 6-7, often only 4 rows were found, consisting always of the larger dorsal suckers. One specimen was examined in which the tentacle on the right side projected from a hole below the bases of the right latero-ventral and ventral arms just anterior to the right eye, and a second specimen was found in which the left tentacle and the left ventral arm had become fused in an unusual manner. This latter case seemed so bizarre that it is considered worthy of full description.

DESCRIPTION

The specimen observed was a female of 13.0 mm mantle length from 150-180 fathoms off Punta Alegre, Camaguey Province, Cuba.

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On first examination the left tentacle appeared to be lacking, a not unusual occurrence in this group of squids, but further examination revealed that this tentacle was fused with the left ventral arm. For detailed study the first three pairs of arms were amputated at their bases. Figure 1 shows the abnormal left ventral arm and tentacle and the normal condition of the right tentacle and arm.

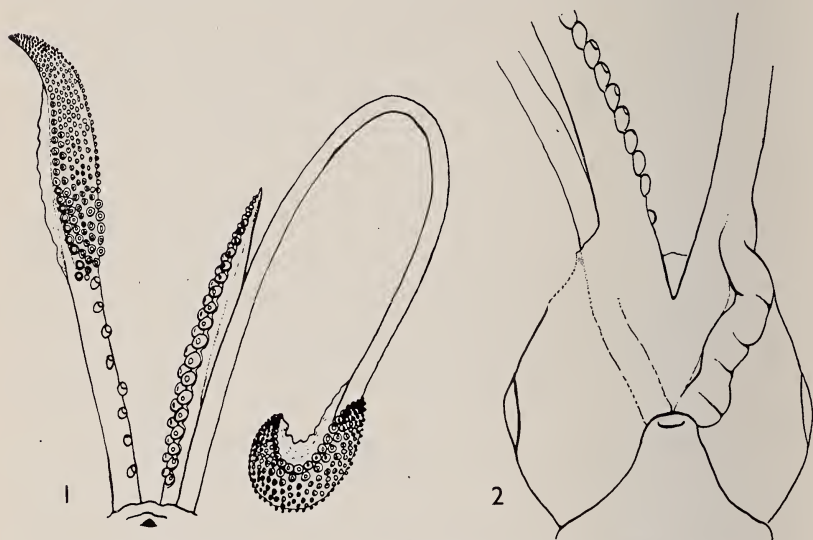


Figure 1. Dorsal view of the fused left tentacle and left ventral arm and the corresponding normal members of the right side.

Figure 2. Ventral view of the ventral arms and tentacles showing the folding of the basal section of the left tentacular stalk and the point of fusion with the left ventral arm.

In a normally developed specimen the right and left ventral arms are mirror images of each other; deeply cleft at the mid-ventral line, stout at the base and tapering to an attenuated point distally. The ventral or inner edge of the arm is smooth and rounded, but the outer or dorsal edge has a broad membrane which extends nearly to the distal extremity of the arm. This membrane is united with the latero-ventral arm about $\frac{1}{3}$ of the distance from the base, forming a pocket within which lies the stalk of the tentacle. The inner or oral surface of the ventral arm bears about 18-20 pairs of subglobular suckers which are carried upon delicate peduncles.

The tentacles are long slender appendages, somewhat rounded in cross-section but flattened on their oral surfaces. They are retrac-

tile into deep pockets on the ventral side of the head between and slightly anterior to the eyes. The tentacles may be withdrawn into the pockets until only the sucker bearing and expanded tentacular club is exposed, cradled between the ventral and latero-ventral arms.

In the present specimen the left ventral arm has a length of 16.0 mm in comparison to the right ventral arm which is only 11.0 mm in length, measured from the proximal sucker to the tip of the arm. Proximally, the first 8.5 mm of the arm bears about 8 suckers of normal size and appearance, arranged in what appears to be a single row but which may be two rows. This section of the arm bears no bordering membrane. The distal 7.5 mm of the arm is a normal tentacular club, originating distal to the eighth sucker and consisting of an oval expanded section which is pointed distally and bears about 8 rows of suckers of which the suckers of the two dorsal rows are 2 to 3 times the diameter of the others. The distal 7.5 mm of the arm, corresponding to the tentacular club is bordered by a broad swimming membrane similar to that bordering the right tentacular club.

The abnormal arm was carefully dissected, and Figure 2 shows the actual condition of the arm, consisting of two separate entities just below the point of fusion. The right tentacular stalk may be seen beneath the transparent epidermis, projecting from its pocket between the two ventral arms. In contrast to this the left tentacular stalk is visibly folded upon itself within the pocket and with a sharp folding at the surface. At the base of the left ventral arm the tentacle becomes fused with the arm. Beyond this point, except for a slight differentiation in color and consistency of the muscle layer in the first few millimeters of the arm, no differences can be distinguished beyond the external appearance.

DISCUSSION

From the evidence at hand and the known developmental history of the Rossiinae, the cause of this abnormality may be explained. Apparently, during the embryological development of this specimen, the tentacle failed to grow out of its pocket or the aperture of the pocket failed to open. As a result, the tentacle grew outward beneath the epidermal layer of the ventral arm. During growth the flattened oral surface of the tentacle was appressed to the aboral surface of the arm and the tentacle continued to grow until the

club extended past the end of the arm. Here growth ceased and the tentacle and the arm became completely fused.

It would be interesting to know whether in the case of the branched arm reported by Okada (1938) this could have been formed in a somewhat similar fashion. The abnormalities found in the genus *Rossia* indicate that it may be subject to considerable irregularities of growth, due perhaps to the habitat which it occupies. No cases of abnormal growth or even of regeneration of parts are known to the author in the open ocean oegopsid squids.

LITERATURE CITED

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